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ABSTRACT

This report evaluates a program which trained participants in the instructional design process and indicates how effective it was for training instructional design personnel. The program was administered to three separate groups on separate occasions (N=8, N=6, N=3). The program, being self-instructional, allowed students to work at their own pace, but they did participate in group discussions. The following data were gathered: time to complete reading and exercise assignments; errors on workbook exercises (constituting criterion-like tasks); and student comments. Analysis of this data revealed that the program worked well. Student comments were generally favorable. The only revisions in the program were made on the instructions to students on how to use the program. Recommendations are made for further evaluation of the revised program. The appendixes include information on workbook error rates; results of final exercises; and participants' comments on overall evaluation, other models, the handbook, and diagramming. Twelve tables of data are presented. (Author/BRB)

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SUPPLEMENTARY FINAL REPORT

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DEVELOPMENT OF COURSE CONTENT AND INSTRUCTIONAL MATERIALS/AIDS FOR THE TRAINING OF EDUCATIONAL RESEARCH, DEVELOPMENT, DIFFUSION, AND EVALUATION PERSONNEL

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1. INTRODUCTION

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Purpose

This volume provides a report on the tryout and revision of a program designed to provide training in the instructional development process (Gropper, 1971a). It supplements a previous report describing the preparation of the training program and the instructional development model it contains (Gropper, 1971b). The prior report appeared almost a year and a half ago.

Why the lag? A number of interrelated reasons suggest themselves. The training program, which was evaluated during this period, runs approximately fifteen hundred pages long and requires at a minimum approximately fifty hours to complete. For purposes of instructional effectiveness the program had to be administered in such a way that the fifty hours of reading and practice could be distributed rather than massed. Because of these time requirements, it was difficult to find groups of subjects willing to take and complete the whole program. It was only because of the fortuitous appointment of the principal investigator as a visiting professor in the Department of Educational Research at Florida State University that the tryout and revision process could actually begin and be successfully completed.

The revision of the program, fairly substantial in scope, also required additional time. All major volmunes in the program, USER'S MANUAL, ORIENTATION, HANDBOOK, WORKBOOK, and FINAL EXERCISES underwent revisions. Changes in the instructional development *model*, minor in scope, were made in just a few sections of the HANDBOOK and in WORKBOOK exercises associated with them. On the other hand, changes in the training vehicle were more substantial in scope: There were two types of changes. The more extensive of the two involved the complete revision of the ORIENTATION volume and partial revision of the USER'S MANUAL to provide trainees with better guidance in the use of the total training vehicle. Other considerably less extensive changes, in this instance of an <u>instructional</u> nature, were made in the HANDBOOK, WORKBOOK, and FINAL EXERCISES. Their purpose was to provide improved guidance for solving the practice problems assigned to trainees. Thus, both tryout and revision consumed substantial time as did the prior search for a sample of the target audience for which the program was designed.

The purpose of this report is to describe both the tryout and revision of the program which was conducted during this period.

What This Report Contains

The major sections of this report provide the following types of information:

- -- Methods Used to Evaluate the Program
  - .. descriptions of tryout sample
  - .. data types
  - .. administrative arrangements
- -- Results Obtained
  - .. raw results
  - .. interpretation
- -- Revisions Made in the Program
  - .. basis for revisions
  - .. revisions made
- -- Conclusions
  - .. overall evaluation
  - .. recommendations

The explicit provision of this range of information will make it possible for potential users of the program to do their own assessment of the effectiveness of the program and of its usefulness for their own purposes.

2. METHOD

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Description of Tryout Sample

1. The Target Audience

The program was designed with a broad target audience in mind varying from trainees with no development experience to developers with considerable experience. The intent was to recommend to the latter group consideration of only the development model (contained in the HANDBOOK). On the other hand, the model and the training vehicle were intended for trainees with no experience varying through trainees with intermediate amounts of prior experience either in classroom or job settings. Selection of a tryout sample was based on the identification of this latter group as the target audience.

2. How the Sample was Obtained

Three separate groups of students participated in the tryout of the program.

Group I consisted of eight Latin American students receiving instruction in development under an A.I.D. program conducted in the Center for Educational Technology at Florida State University. Personnel running the A.I.D. program volunteered the group as participants in the tryout. The individual students, however, could not be considered volunteers. This phase of the tryout occurred before the principal investigator assumed a visiting professorship at Florida State and before he was offered it.

Group II consisted of six students enrolled in Ph.D. programs at the Department of Educational Research at Florida State. They took the program as part of a course offered by the principal inventigator during the Fall quarter. The course is a required course (which is offered throughout the year) in the "instructional systems" subsection of the Department of Educational Research. However, taking the program was one of two options offered students who had enrolled for the course. Of the two options, taking the program was by far the more time consuming. Three students dropped the course. The six who remained and took the program can be called volunteers.

Group III consisted of three students enrolled in Ph.D. programs in the College of Education at Florida State University. They took the program as part of a course offered by the principal investigator during the Spring quarter. This course deal contingency management. The three students in Group III, for varying reasons, elected not to study contingency management. The principal investigator offered to run a separate section on instructional technology. The three students in Group III volunteered for this option.

3. Characteristics of the Three Groups

The generalizability of tryout results based on a sample drawn from a target population depends on the degree to which sample and population share common characteristics. Since the target population was neither precisely defined nor was the sample randomly selected, all that can be done is to describe characteristics of the sample identified on a rational basis as being relevant to recommendations for program use. Prior design training or experience, career goals, and level of prior academic training appear to be relevant characteristics. Table 1 on the next page summarizes for each of the three groups subject possession of these various, relevant characteristics.

An inspection of Table 1 reveals that, except for one or two characteristics such as prior teaching experience and undergraduate major, the total sample on the whole splits mainly down the middle on possession or non-possession of each of the relevant characteristics. Almost half has had no prior design courses, is not enrolled in a Ph.D. "systems" program or has only a B.A. degree.

Possession of characteristics which might be expected to facilitate performance on this new program cannot automatically be judged to have exerted a facilitating effect. Having had prior design courses or prior design experience cannot automatically be thought either to have provided prerequisite skills for implementing the current, new model or to have provided some skills involved in its implementation. While it is true that differing models do share common strategies and sometimes common tactics designed to achieve them, it is also probably true that models differ considerably. For example, students at Florida State have had experience with one model which differs considerably from the present

Table 1

Characteristics of Subjects in Each of Three Participating Groups*

	Group I						Group II						Group III		
	#1	#2	#3	#4	#5	#6	#1	#2	#3	#4	#5	#6	#1	#2	#3
Taken previous design courses	yes	no	no	no	yes	yes	no	yes		yes	yes	yes	no	yes	yes
Some previous design experience	yes	no	no	no	no	yes				yes	yes	yes	yes	yes	yes
Some teaching experience	yes	no	yes	yes	yes	yes		yes	yes	yes	yes		yes	yes	yes
Enrolled in Ph.D. instructional systems program	no	no	no	no	no	yes	yes	yes	yes	yes	yes	yes	no	no	yes
Highest degree	B.A.	B.A.	B.A.	M.S.	B.A.	M.S.	M.S.	M.S.	M.A.	B.A.	B.A.	B.A.	B.S.	M.S.	M.S.
Undergraduate major in education or psychology	yes	no	yes	yes	no	no	yes	yes	no			no	yes	yes	yes

*Blanks in cells indicate missing data

**Data available for only six of the eight participants in group I

one both in the amount of procedural detail it offers and in procedural content (Briggs, 1970). One key instance of such differences involves the taxonomy of behaviors used in the models. Since taxonomies are central to models, with many other procedural prescriptions hanging on them, proficiency in one model does not insure or necessarily facilitate proficiency in another. And, indeed, interference and more difficulty in learning the second model (the one being assessed in this study) is a distinct possibility.

About half the students in groups II and III have taken the Briggs course on instructional design. Results of program evaluation, reveal superior performance in some areas by students who have had the Briggs course (or other courses) and superior performance in other areas by students who have not had any prior course. Data on this particular issue is not available in sufficient detail or can they be made in a sufficiently differentiated way to draw well founded judgments. Perhaps the safest conclusion to draw is that the prior experience may not have interfered with their learning to implement the present model. Also if it had a facilitating affect, that effect is not likely to have been sizeable. The model was sufficiently new in procedural detail as to have required a new and major learning experience.

The results of groups II and III were given greater weight than those of groups I for the following reasons:

- group I, a Latin speaking group, had some difficulty with English vocabulary. For that reason they are not fully representative of the target audience.
- group I, for a variety of reasons, including internal politics and squabbles and differences with personnel administering their training as to the appropriate content of this training did not complete all of the program.
- although all groups, to use the boldest of language, cheated on the program (i.e. copied answers from answer pages designed to provide them with feedback), group I appears on the basis of internal evidence to have indulged in this practice to a greater extent.

Data Sources

The principal data types obtained for the evaluation of the program are:

- .. student performance on program exercises--in the WORKBOOK and in the FINAL EXERCISES volume
- .. student written and oral comments on program features and their experience in taking the program.

Performance data, primarily errors, were based on student self-scoring and self-reporting (for groups II and III) and based on supervisory scoring and reporting (for group I). Oral and written comments were obtained during weekly class meetings from groups II and III. Comments served to identify:

- .. areas in the HANDBOOK, WORKBOOK, or FINAL EXERCISE volumes where students identified difficulties
- .. administrative difficulties experienced in going through the program
- .. program features they found helpful or non-helpful (both with respect to model prescriptions and with respect to the training vehicle).

Administrative Arrangements

1. Standardized Administrative Arrangements

Instructions for taking the program appear in the USER'S MANUAL and in the ORIENTATION volume. Additional detailed scheduling instructions also appear in the WORKBOOK and the FINAL EXERCISES volume. Taken together, instructions, no matter in which volume they appear, are designed to guide students or trainees through the following standardized routine:

- .. a subject reads the USER'S MANUAL and the ORIENTATION volume; following instructions which appear in the latter volume he actively inspects

all program components and identifies both the kinds of information they provide and the methods recommended for using them.

.. a subject follows the schedule of events identified in gross detail in the USER's MANUAL and in specific detail on divider pages in the WORKBOOK. He reads an assigned portion of the HANDBOOK sub-volume he is working on and then does the WORKBOOK exercises associated with it; as he completes each exercise he inspects answer pages provided to give him feedback as to the correctness of his own responses; when he has completed all the exercises associated with a given reading assignment, he then moves on to the next reading assignment and its associated exercises.

.. when the subject completes all reading assignments and all WORKBOOK practice assignments associated with a HANDBOOK sub-volume, he then does the FINAL EXERCISE associated with that HANDBOOK sub-volume.

.. following completion of the FINAL EXERCISE, the subject resumes the cycle of reading and practice for the next, regularly scheduled HANDBOOK sub-volume.

.. this routine continues until all the HANDBOOK sub-volumes have been read, all the WORKBOOK exercises completed, and all the FINAL EXERCISES completed.

Except in the case where attrition to the sample occurred (to be described later), all tryout subjects followed this standard routine. Additions to this routine are described below for each of the three participating groups.

2. Group I Arrangements

The eight subjects in group I took the program following the routine described above. They worked at their own pace. Although the program was

designed to be self-instructional, subjects in this group did interact with one another and with members of the A.I.D. project staff. Subject of their discussions were difficulties they experienced with procedural instructions, vocabulary, or program content. Resolution of these problems occurred after subjects attempted to negotiate the program themselves. However, resolution of problems occurred frequently enough and at enough points in early portions of the program so that problems were less likely to be cumulative and less likely to recur in subsequent portions of the program. Under such arrangements, the program can be said to have been self-instructional in only a limited sense. How portions of the program scheduled late in the sequence would have fared without such local, personal guidance and correction remains indeterminate.

3. Group II and Group III Arrangements

Administrative arrangements for group II and III were under the control of the principal investigator. In most respects they paralleled the arrangements which were used with group I.

The program was administered in weekly course segments. While subjects were allowed to adopt their own pace, they were required to complete weekly assignments. The most frequently occurring type of assignment involved the reading of an entire HANDBOOK sub-volume and the completion of both the WORKBOOK exercises and the FINAL EXERCISE associated with it. Thus, subjects could pace themselves within the time available during a week's interval.

Following the completion of each weekly assignment subjects met with the principal investigator for a regularly scheduled three hour discussion session. It was at this time that subjects provided oral and written comments about the program and about difficulties (or lack of it) they experienced. Subjects also critiqued the products of one another's FINAL EXERCISE activities.

The learning experience which groups II and III underwent can be described as having been composed of a combination of self-instruction , plus group discussions, plus evaluation by the principal investigator. As was the case for group I, the evaluation of program segments late in the sequence has to take into account the effect of guidance and correction which occurred earlier in the sequence.

3. RESULTS

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Introduction

For purposes of answering what kinds of questions were data collected? Were the data actually collected suitable for those purposes? This latter issue will be the subject of the last, interpretive section of this chapter on results. Here, those major issues relevant to the evaluation of any program intended to provide training in instructional design will be identified. They are the issues of: (1) model adequacy; (2) training vehicle adequacy; and (3) administrative arrangements adequacy.

1. Model adequacy

The issue of model adequacy does not concern the effectiveness of the program used to train instructional designers. It does concern the adequacy of the program *content* they are being taught. It concerns such interrelated questions as:

> . . Is the design model, that is to say, the prescriptions or procedural rules for designing instruction, a valid model? Is it relevant to all the kinds of objectives developers will have to teach?
>
> . . Assuming the adequacy of the vehicle employed to train subjects in the implementation of the model, can the model be implemented in a consistent or reliable way? Do independent subjects produce comparable development products?
>
> . . When consistently implemented, does the implementation of the model produce instructional programs which work? When subjects follow the procedures required by the model, do they produce programs which effectively teach *their* students?

It will be of interest to determine whether the data collected can answer these questions.

2. Training vehicle adequacy

Empirical tryout of a program is designed primarily to answer the questions of training vehicle adequacy. It concerns such interrelated questions as:

- . . Are the practice tasks which make up the program relevant to the goal of preparing subjects to implement a particular development model?
- . . Does the training vehicle do an effective job of training subjects to implement the model?
- . . If there are inadequacies in the training vehicle, what are they? Which specific portions of the vehicle are effective and which ineffective? Which training needs are achieved and which are not?
- . . If portions of a training vehicle are ineffective, what accounts for that ineffectiveness? What kind of revision will increase their effectiveness?

3. Administrative arrangements adequacy

A training vehicle cannot demonstrate its effectiveness unless the vehicle is used properly. Accordingly, there are important questions to ask concerning the adequacy of instructions about program administration:

- . . Are the recommended procedures for going through a program followed correctly and consistently?
- . . If there are procedural failures, what are they and to what properties of the instructions provided can account for them?

The next four sections of this, the results chapter will provide the raw data collected. The final section of this chapter will interpret their relevance to these questions and will provide those answers they are capable of providing.

Results of WORKBOOK Exercises

The entire WORKBOOK contained a total of 589 scorable responses. Some of these responses involved the simple endorsement of multiple choice options. Other responses, often much more complex and considerably larger in scope, required subjects to *produce* their answers. Thus, while the *number* of responses may appear to be small, considering the scope of the competencies the program is designed to foster, awareness of the criterion-like complexity, scope, and difficulty of many of the responses leads to a fairer appraisal of what the program demanded of subjects taking it. Table 2 indicates how the 589 responses were distributed among the various sections of the WORKBOOK. Each of the separate sections is associated with a major task in the development process. The relative number of responses per task does

Table 2

Distribution of Practice Responses
Among Major Development Tasks*

HANDBOOK Subvolume	TASK	Number of Responses
B	analysis of criterion behaviors	77
C	sequencing behaviors	15
D	stating objectives	44
E	planning simulation	58
F	developing tests	54
G	formulating instructional strategies	152
I	developing instructional materials	78
J	trying out and revising materials	112

*There were no exercises associated with Tasks A and H.

in part reflect scope. But in view of the comments made earlier, it can be fairly said that the distribution also conceals what is expected of the subject. Ten responses in one area may be more demanding than twenty or thirty in another.

There is little point in providing a detailed breakdown of types. Suffice it to say that the number and type of responses built into WORKBOOK were precisely what the developers of the program judged to be necessary to teach instructional design skills. The success of the program in teaching those skills (e.g., on FINAL EXERCISES) can attest to the adequacy of that judgment.

Table 3 on the next page provides a summary of the overall error rates on WORKBOOK exercises associated with each of the eight of the ten development tasks for which exercises had been prepared.

Appendix A provides an error rate breakdown for groups of exercises associated with steps or sub-steps all of which comprise each major tasks. It is this latter kind of more detailed information which served as the basis for revision of HANDBOOK sections. Data for groups of exercises associated with sub-sections of the HANDBOOK were used to evaluate the adequacy of the sub-sections to *cue* correct practice of specific development activities. More detailed response by response analyses were also performed and served as a basis for revision of specific WORKBOOK practice problems. This latter type of detailed results on each practice item is not reproduced in this volume.

Returning to Table 3 which *summarizes* WORKBOOK error rates associated with each of the eight HANDBOOK subvolumes for which there are practice exercises, each numerical entry represents the percentage of subjects in each of the tryout groups scoring at one of these error-rate levels: zero error rate, less than 20% error rate, and more tha 20% error rate.

The data are tabled to answer two primary questions: (1) Is there consistency among the three groups in the error rate patterns?, and (2) With usual developmental tryout standards in mind, how do each of the major sections of the program fare? In answering these questions, entries for the rows <20% (less than twenty percent) and 0% can be combined. This results in a combined figure indicating error rates of less than 20%. Settling on this cutting point is justifiable on at least two counts. First of all, it is not an reasonable standard for purposes of tryout of instructional materials during developmental or formative evaluation. Secondly, because the size of all three tryout groups is relatively small, a difference of

Table 3

Overall Error Rates Obtained on Exercises
Associated with Each of Eight Major Development Tasks

TASK	Error Rate	GROUPS I	II	III
J 112 items	>20%	28%	13%	25%
	<20%	24%	24%	
	0%	48%	63%	75%
		n=8	n=6	n=3
I 78 items	>20%	08%	08%	17%
	<20%	19%	07%	
	0%	73%	85%	83%
		n=8	n=6	n=3
G 151 items	>20%	20%	12%	27%
	<20%	32%	26%	
	0%	48%	62%	73%
		n=8	n=6	n=3
F 54 items	>20%	24%	22%	22%
	<20%	22%	26%	
	0%	54%	52%	78%
		n=7	n=6	n=3

TASK	Error Rate	GROUPS I	II	III
E 58 items	>20%		34%	46%
	<20%		34%	
	0%		32%	54%
		n=	n=6	n=3
D 44 items	>20%		09%	05%
	<20%	16%	23%	
	0%	84%	68%	95%
		n=5	n=6	n=3
C 15 items	>20%		07%	40%
	<20%	07%	40%	
	0%	93%	53%	60%
		n=5	n=6	n=3
B 77 items	>20%		06%	19%
	<20%	06%	36%	
	0%	94%	58%	81%
		n=5	n=6	n=3

one additional subject, tends to make error rates jump inordinately. Under these circumstances, attempting to adhere to the oft cited 10% error rate would be next to impossible. For both reasons, "Less than 20%" is the standard set.

On this standard, how do the three tryout groups compare? Inspection alone reveals remarkable high consistency among the three groups. This consistency obtains for all major tasks. Whatever deviations there are are more likely to be attributable to the small sample size and the sizeable increases or decreases in error rates due to a change in performance of one tryout subject.

How do the exercises associated with the different tasks compare? By and large, the percentage of subjects scoring at less than a 20% error rate is quite high. This result holds for most of the eight tasks--with TASK E being the major exception. Table 4 provides a summary of weighted, average percentage (across groups) of subjects performing at less than a twenty percent error rate. This is done task by task.

Table 4

Average Percent of Subjects Performing
at less than a Twenty Percent Error Rate

TASK	Average Percentage of Students
J	77%
I	90%
G	82%
F	77%
E	40%
D	95%
C	88%
B	93%

Except for TASK E, percentages are relatively high indicating medium to high program effectiveness. In passing, it should be noted that the practice exercises in TASK E are highly judgmental in nature. Error rates reflect discrepancies between subject's *ratings* and program set ratings. Since the latter are also subjective, it is not unusual for differences in rating levels to occur as between different raters.

The more detailed result in Appendix A and the still more detailed results (for each practice problem) served as the basis for revision of the highly "local" learning difficulties generated by specific sections of the program. The pattern of WORKBOOK results summarized in the two tables above suggest no generalized or widespread program inadequacies.

Results of FINAL EXERCISES

With the completion of all the separate WORKBOOK exercises associated with a particular TASK, subjects moved on to a FINAL EXERCISE for that task. In the final exercise, subjects were expected to perform all the major routines and sub-routines, heretofore practiced separately, in their entirety and in sequence. Each FINAL EXERCISE generally required subjects to perform a specific, total task and the next task in the development process. Thus, there was generally more than one opportunity to practice each task. For example, although there was only one FINAL EXERCISE associated with TASK G,'Formulating Instructional Strategies,' there were actually two opportunities to practice this particular, entire task. Results provided below will identify the number of times each major task was practiced.

Each FINAL EXERCISE involved the completion of specific forms used in the implementation of a particular task. Scoring of FINAL EXERICSES, on the one hand, consisted of an assessment of whether or not a form was correctly filled out; that is, were all the blanks filled out. This decision on adequacy was done simply on a yes/no basis. It was a decision about procedure. Scoring also consisted of assessing the validity of entries. Since content could vary and still be valid, adequacy was again judged on a simple yes/no basis.

Tables 5-8 summarize results of this type of analysis only for groups II and III. (Subjects in Group I either did not do the final exercises at all, or did not complete them all, or it is suspected they did them after first checking illustrative 'answers'). Tables 5 and 6 summarize percentages of students doing each exercise correctly. Tables 7 and 8 disregards in which exercise each type of task was done and summarizes the results for each type of task.

Table 5

Percentage of Students in Group II
Correctly Performing Development Tasks on Final Exercises
n=6 Students

Type of Activity	Performed in - Exercise	FORM Correctly used	Content Validity
J Analysis of tryout results	#1	100%*	100%*
J Revisions of instructional program	#1	N.A.	100%
I Development of a program	#2	83%	83%
I Development of a program	#3	100%	100%
G Formulating a strategy	#3	100%	100%
G Formulating a strategy	#4	100%*	100%*
F Constructing a test	#4	100%	100%
F Constructing a test	#5	100%	100%
E Simulating	#5	100%	100%
E Simulating	#6	100%**	100%**
D Stating objectives	#6	100%	83%
D Stating objectives	#7	100%	67%
D Stating objectives	#8	100%*	100%*
B Analysis of behavior	#7	100%	50%
B Analysis of behavior	#8	100%	100%

* N=5
** N=3

Table 6

Percentage of Students in Group III
Correctly Performing Development Tasks on Final Exercises
n=3 Students

Type of Activity	Performed in Exercise:	FORM Correctly Used	Content Validity
J Analysis of tryout results	#1	N.A.	100%
J Revisions of instructional program	#1	N.A.	100%
I Development of a program	#2	83%	83%
I Development of a program	#3	100%	100%
G Formulating a strategy	#3	100%	100%
G Formulating a strategy	#4	100%	100%
F Constructing a test	#4	100%	100%
F Constructing a test	#5	100%	100%
E Simulating	#5	100%	100%
E Simulating	#6	100%	100%
D Stating objectives	#6	100%	83%
D Stating objectives	#7	100%	67%
D Stating objectives	#8	100%	100%
B Analysis of behavior	#7	100%	50%
B Analysis of behavior	#8	100%	100%

Table 7

Percentage of Exercises Devoted to a Development Activity
Correctly Performed by Each Subject in Group II

S U B J E C T S

TASKS	#1		#2		#3		#4		#5		#6	
	Form	Content	Form	Content	Form	Content	Form	Content	Form	Content	Form	Content
Analysis of tryout results n=1	100%	100%	100%	100%	100%	100%	--	--	100%	100%	100%	100%
Program revision n=1	100%	100%	100%	100%	100%	100%	--	--	100%	100%	100%	100%
Program development n=2	100%	100%	100%	100%	100%	100%	50%	100%	100%	50%	100%	100%
Formulating strategies n=2	100%	100%	100%	100%	100%	100%	100%*	100%*	100%	100%	100%	100%
Constructing tests n=2	100%	100%	100%	100%	100%	100%	100%*	100%*	100%	100%	100%	100%
Simulation n=2	100%*	100%*	100%*	100%*	100%	100%	100%	100%	100%	100%	100%*	100%*
Stating objectives n=3	100%	100%	100%	67%	100%	67%	100%	67%	100%	100%	100%**	100%**
Analysis of behavior	100%	50%	100%	100%	100%	50%	100%	100%	100%	50%	100%	100%

n=number of practice opportunities

*n-1 **n=2

Table 8

Percentage of Exercises Devoted to a Development Activity Correctly Performed by All Subjects in Group III

S U B J E C T S

TASKS	Form	Content
Analysis of tryout results n=1	100%	100%
Program revision n=1	100%	100%
Program development n=1	100%	67%
Formulating strategies n=2	100%	100%
Constructing tests n=2	100%	100%
Simulation n=2	100%	100%
Stating objectives n=3	100%	55%
Analysis of behavior n=2	100%	83%

n=number of practice opportunities

Appendix B provides the detailed results which tables 5-8 summarize.

Inspection of tables 5-8 reveals that, with a few exceptions and then only to a minor degree, achievement for all final exercises and for all subjects was at a high level.

Time Data

The potential user of any program needs to know how much instructional time will be required to complete the program. For that purpose, subjects in Group II (n=6) were asked to keep records of time it took them to read assigned HANDBOOK subsections and to do the WORKBOOK practice exercises associated with them. Tables 9 and 10 provide such time data in hours and table 11 provides times of the two activities combined.

Table 9

Report Reading Time (in Hours)
for HANDBOOK Sub-volumes
(Group II)

Sub-Volumes

Subject #	J	I	H	G	F	E	D	C	B	A	All Volumes
1	5.0	4.0		2.8	1.7	0.5	0.8	1.5	2.5		18.8
2	6.0	2.0	0.8	4.5	1.2	0.8	1.2		1.8		18.3
3	2.5	1.3	0.3	2.0	1.1	0.5	1.0	0.5	1.9	0.6	11.7
4	4.0	1.5	0.5	2.2	2.5	0.8	1.3	0.5	3.5		17.8
5	1.9	0.7		2.0	1.1	0.8	1.3	0.6	1.8		10.2
Mean Time	3.8	1.9	0.5	2.7	1.5	0.7	1.1	0.8	2.3	0.6	15.4

Range

Low	1.9	0.7	0.3	2.0	1.1	0.5	0.8	0.5	1.8		10.2
High	6.0	4.0	0.8	4.5	2.5	0.8	1.3	1.5	3.5		18.8

Table 10

Reported Work Time (in Hours)
for WORKBOOK Exercises
Associated with each HANDBOOK Sub-Volume
(Group II)

Sub-Volume

Subject #	J	I	H*	G	F	E	D	C	B	A*	All Volumes
1	3.0	2.8		3.6	1.0	0.7	0.8	0.5			12.4
2	1.8	1.3		3.6	0.7	1.0	0.8		1.2		10.4
3	1.1	1.0		2.1	0.8	0.6	0.6	0.5	1.6		7.6
4	1.5	0.8		1.4	1.3	0.5	0.8	0.8	1.5		8.6
5	1.5	1.1		1.0	1.0	0.4	0.8	0.3	1.3		7.4
Mean Time	1.8	1.4		2.3	0.9	0.6	0.8	0.5	1.4		9.3

RANGE

Low	1.1	0.8		1.0	0.7	0.4	0.6	0.3	1.2		7.4
High	3.0	2.8		3.6	1.3	1.0	0.8	0.8	1.6		12.4

* No exercises for these subvolumes

Table 11

Combined Reading and Work Times
for each Subject
(in hours)

	Reading	Work	Total
#1	18.8	12.4	31.2
#2	18.3	10.4	28.7
#3	11.7	7.6	19.3
#4	17.8	8.6	26.4
#5	10.2	7.4	17.6

Low	10.2	7.4	17.6
High	18.8	12.4	31.2

From Table 11, it can be observed that the smallest completion time was 17.6 hours, the largest 31.2 hours. To these totals must be added the times required to read the USER'S MANUAL, to do the ORIENTATION exercises, and to do the FINAL EXERCISES. There are no systematic data available for these latter activities. Based on student comments and fragmentary data, it is estimated that their time requirements are as indicated in Table 12.

Table 12

Minimum Estimated Time
Required to Complete
Three Program Activities
(in hours)

ACTIVITY	MINIMUM ESTIMATED TIME REQUIRED
Reading the USER'S MANUAL	1
Doing the ORIENTATION exercises	2
Doing FINAL EXERCISES: (9 exercises) @ 3hrs/exercise	27

Adding this additional estimate of thirty hours to the high and low levels of obtained time data, it appears that the total time likely to be required to complete all program activities ranges from a low of approximately 47 hours to a high of 61 hours.

Subjects' Comments

Group II (n=6) met with the principal investigator on a weekly basis to discuss their weekly assignments. Subjects in this group, as part of their assignment, provided both written and oral comments on the model. on the training vehicle, and on administrative arrangements. Because of this constant interaction between tryout subjects and the developer, the Group II tryout, in addition to its developmental tryout functions, was also able to capitalize on the properties of tryout only available in informal tryout.

Subjects were able to comment on any and all features of the program, identifying among other things:

- --- typographical errors
- --- examples which were unfamiliar
- --- missing information
- --- unclear instructions about scope, type of assignments or response
- --- omissions or inadequacies in the model (according to their judgment)
- --- difficulties with reading sections in the HANDBOOK
- --- exercise difficulties

No attempt has been made to quantify the information obtained from students comments. However, all student comments, in their entirety and with no omissions, are reproduced in Appendices C, D, E, and F. These provide respectively:

- --- an overview evaluation of the model and the training vehicle
- --- a comparison with other models (with which subjects are familiar
- --- an evaluation of specific subvolumes (some volumes not evaluated)
- --- an evaluation of the diagramming techniques used throughout the HANDBOOK

Further references to subjects' comments will be made in the final interpretive section of this chapter.

Interpretation

1. Model adequacy

Keeping in mind the disctinction between the content of an instructional program (in this instance the instructional design model being taught) and the vehicle used to teach the content, it is safe to say that performance data (e.g. program errors) can in only a very limited way answer questions about the adequacy of the design model. It is for research and/or applied efforts, not developmental tryout, to answer questions about: the relevance of the model to the range of objectives likely to be taught or the effectiveness of instructional programs produced according to model prescriptions.

It would have been possible to have subjects prepare programs (according to model prescriptions) and to assess the instructional adequacy of those programs. This was not done here. Even had it been done, such global assessment would be insufficiently diagnostic of model strengths and weakness. Programs which fail can do so for any number of alternative weaknesses in a design model. Moreover, the requirements of tryout and revision tends to gloss over program inadequacy. It would appear to be appropriate in assessing design models to consider instructional effectiveness prior to revision and to consider how much revision is required and how many cycles of revision are required.

Subjects' performance, while not suitable for assessing model validity, is suitable for assessing the reliability with which students implement the model. The consistently high achievement levels attained by all subjects in FINAL EXERCISES, the most job-like tasks to be found in the program, do suggest that the model can be reliably implemented.

Subjects' attitudes, as expressed through their comments, are not suitable data in assessing model relevancy or effectiveness. Empirical data are. However, subjects' attitudes are suitable for assessing the likelihood of a model (as opposed to other models) subsequently being implemented. A review of subjects' comments to be found in Appendices C, D, and E do

suggest highly favorable attitudes toward the usefulness of various portions of the model. There were of course individual differences among subjects in their preference for particular parts of the model. A common negative attitude expressed concerned the treatment of 'individual differences.' Subjects apparently had more confidence in the currently available evidence concerning aptitude--treatment--interactions than did the principal investigator.

In summary, the most that can be said about the adequacy of the development model, based on tryout data which is not generally suitable for assessing models, is that model procedures can be reliably implemented and that tryout subjects have faborable attitudes toward portions of the model (there being individual differences was to which portions individual subjects favor).

Training Vehicle Adequacy

Based both on subjects' performance and comments it is possible to make the following conclusions about the adequacy of the training vehicle.

--- students in Group II had an initial appreciable degree of difficulty in making use of the novel diagrammed formats which appear in the HANDBOOK; this difficulty diminished with increased use.

--- students in Group III (Who had been exposed to a revised ORIENTATION volume and who had been required to read Volume "A" for orienting, overview purposes (also a revised procedure) had less difficulty getting started in working with diagrams.

--- The relatively low error rates on both WORKBOOK exercises and on FINAL EXERCISES suggest that the amount and type of cueing provided in both the HANDBOOK and in the WORKBOOK are adequate; and

--- The relatively low error rates on FINAL EXERCISES suggest that the cummulative practice experience was adequate to build criterion proficiency in implementing the design model being taught.

Administrative Arrangements

Based on administrator comments (Group I) and subject comments, it is possible to make the following conclusions:

--- There was little difficulty in following the instructions for the overall routines prescribed for the use of the program;

--- Some initial difficulty was experienced in identifying the prescribed, specific sequencing, listed in the WORKBOOK, to follow in reading HANDBOOK subsections and doing exercises associated with them; this difficulty diminished as subjects continued on to later assignments; and

--- Some initial difficulty was experienced in performing the first FINAL EXERCISE with subjects not knowing what was provided as information and what the practice assignment was; this difficulty also diminished as subjects progressed to subsequent assignments.

4. PROGRAM REVISION

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. . Changes in the Development Model 4.3
. . Changes in the Training Vehicle 4.4
. . Changes in Administrative Arrangements . 4.8

Introduction

Changes were made in all the volumes which make up the program. Some changes were major, others minor. They were made based on problems identified on the basis of both subjects' performance and comments. In the sections that follow revisions which are discussed will be related to problems that had been identified rather than simply in terms of which volume was revised.

Revisions in the Design Model

Revisions were made in the design model (which is presented in the HANDBOOK volumes). These changes were based, not on considerations arising out of tryout results (which, as pointed out, were not relevant to the issue of model adequacy) but on rational considerations.

Only one change was made in the model. The change consisted only in a change in terminology. It represented a switch from new, idiosyncratic terminology to conventionally used terminology. Essential distinctions were maintained in the change and only labels for categories being distinguished were changed. Specifically, the original model referred to three types of objectives: criterion, modified preparatory, and unmodified preparatory objectives. The new terminology became: criterion, sub-criterion, and preparatory objectives. (Labeling changes in HANDBOOK sections on types of tests were made to parallel these changes.) These changes bring the terminology into line with that found in the literature (with "preparatory" objectives being the counterpart of "enabling" objectives). There had been an expectation that the original terminology would serve "surplus" functions in guiding development procedures. However, confusion due to terminology prompted the change - with no expected loss in the guidance value attributable to the distinctions being made.

Revisions in the Training Vehicle

A number of revisions which have been made are intended to solve one or more identified problems. Accordingly, they may be referred to several times below.

1. Revisions due to problems created through the use of backward chaining

Tasks in the development process are taught in the reverse order from that in which they are usually performed. As a result, a number of concepts, procedures, forms, etc., which are introduced in volumes for tasks earlier in the overall design process, are referred to in the later volumes without explanation. To enable the learner to deal with them, a number of changes were made. These are listed below.

a. A glossary

A glossary was prepared containing key terms which are used throughout the several volumes of the HANDBOOK (the basic guide to the design model). The glossary, which appears in the beginning of the Index subvolume of the HANDBOOK, provides a definition for each term and cites sections of the HANDBOOK for additional information on it.

The glossary was available for use by group III. From their comments, it is apparent that subjects in this group did use it for the purposes it was intended to serve.

b. A procedural, overview map

A diagrammed map of all the procedural steps in the design process was prepared and also inserted at the beginning of the Index subvolume of the HANDBOOK. Its purpose was to identify where in the overall design process a subject is, when he is performing a particular task, or a step, or a sub-step. This orienting map is available for use as a learning aid when the subject is working backward while *learning* to design instrumental materials or as a job aid when the subject is working forward while doing on-the-job design tasks.

c. More guidance in FINAL EXERCISES

When performing a FINAL EXERCISE on a particular task, a subject has available to him completed forms representing the output of tasks which come earlier in the design process. But these are tasks he has not learned to perform. Thus, completed examples of forms used in these tasks represent unfamiliar materials. To offset this problem, additional *cues* were prepared to call attention to particular features of the forms or of the content presented in them. Such cues were designed to familiarize subjects with the forms themselves and their content and to orient them to their relationship to forms involved in prior and in subsequent tasks. Forms which, without such cues might have been obscure and meaningless, are thus now more likely to be more readily accessible.

d. A change in the sequence of assignments

The basic "backward chaining" sequence calls for subjects to work from tasks J, I, H, etc. backward in the design process. in the revision this sequence is maintained. However, subjects are now instructed to read HANDBOOK subvolume "A" (for which there are no exercises) before starting on "J." This is largely for orienting purposes. All the forms used in tasks B-J are introduced in the "A" volume. Thus, subjects have a chance to familiarize themselves with them so that when they encounter them in backward chained FINAL EXERCISES they no longer are unfamiliar forms.

2. Revisions due to problems created by unfamiliarity with diagrammed formats.

a. The ORIENTATION volume

The HANDBOOK, which was designed to serve both as a learning aid and as a job aid, uses diagrammed formats throughout. For subjects accustomed to presentations in connected discourse formats, this novel presentation format took some getting used to. Particularly, subjects were initially confused about whether to read down columns or to read across rows. They were initially uncertain about how much of the detail they needed to inspect. They were initially unclear as to how the different types of

diagrams were to be used. To clear up these various problems, the ORIENTATION volume was completely revised.

Where the original version had subjects only inspecting portions of the HANDBOOK on instruction, the revised version precedes this instruction with guided inspection of illustrative diagrams. Diagrams are reproduced in the ORIENTATION volume itself. The text now calls attention to specific features of various types of diagrams and to how they are to be used. More detailed guidance is provided on what the subject is expected to get from each diagram. Subjects are reassured that memorization (a frequent subject preoccupation) of detail is not necessary. Rather, it is the concept(s) or principle(s) which is important. Once subjects feel self-assured that they have understood the concept or principle, they are free (the instructions state) to read additional material on a given diagram or to go on to another - whichever they choose to do.

b. The Administrative Manual

To reinforce the point about "understanding" rather than memorizing, instructions in the administrative manual also stresses the point.

3. Revisions due to problems created by insufficient cueing

The patterns of errors on exercises, both in the WORKBOOK and FINAL EXERCISES volumes, suggested no serial cumulative difficulties. Whatever difficulties there were, were local and isolated. Scattered, minor revisions were made in the HANDBOOK: the addition, omission, or revision of a page; the addition of or substitution of an example; and the addition of or reinstatement of a rule, principle, or definition. WORKBOOK revision also consisted of scattered, minor revisions: task instructions were changed; an example was revised or a new example was substituted; and cues were changed or added.

On the whole, due to relatively low error rates, the percentage of material altered is difficult to estimate quantitatively, is judged to be low. On the conservative side, it is possible to

estimate that less than ten percent of the HANDBOOK and WORKBOOK was revised.*

4. Revisions due to problems created by failure to provide a sufficient overview of the design process.

Whenever the behavior to be taught is complex and involves many routines and subroutines, it becomes necessary to teach the behavior part by part. Eventually, the parts must be brought together and interrelated. Based on subjects' comments, it became apparent that because of the sheer scope of the model being taught, subjects working on isolated parts of the design process were having difficulty keeping track of where in the total process they were. A number of revisions were made to deal with this problem.

a. A change in sequence

As already noted, the reading of HANDBOOK sub-volume "A" was rescheduled. It became the first assignment, now occurring prior to practice involving sub-volume "J". The inspection of all diagrams involved the various tasks in the design process (task analysis, stating objectives, simulation, test construction, etc.), now provides not only for the identification of forms which subjects will eventually use themselves but also for an overview of the entire design process.

b. An overview map of the design process

The Index sub-volume (of the HANDBOOK) provides an overview page for each STEP in the design process. Each such page lists all the SUB-STEPS involved in a STEP. Subjects are instructed to keep this page open before them as they work on a particular STEP. Thus, while working on a SUB-STEP within that STEP, they can easily identify the SUB-STEPS which preceded it and those that will follow it. No change was made in this provision.

*This represents revisions based on performance. As noted earlier, some changes were made in the HANDBOOK due to the decision to make revisions in the design model.

A new, summary map was created and inserted at the beginning of the Index sub-volume. It provides a more global listing of TASKS and STEPS. It also identifies the outputs of particular tasks and steps which become inputs to other tasks and steps. This "map" is designed to provide an overview for subjects - indicating the interrelating steps among component procedures and to orient subjects as to where they are at any point in their learning experience.

c. A new, added FINAL EXERCISE

The original FINAL EXERCISE volume contained eight separate final exercises. Each was devoted to a simple, separate development task, i.e., doing a task analysis, or writing objectives, or formulating an instructional strategy, etc. These eight exercises (with the revisions cited earlier) are retained in the revision. A ninth exercise has been added. It requires subjects to select subject matter of their own and to go through all the tasks in the development process including following all the front end analyses, the development of a program, and its tryout and revision. This exercise is designed to have subjects interrelate all development tasks and to practice them in a correct, total sequence. This kind of practice parallels the kind of performance they will ultimately be expected to engage in.

Revisions in Instructions on Administrative Arrangements

1. Revisions in instructions on the sequence of practice activities

Because of the sheer size of the program and because of the requirement of shifting from work with one volume (e.g., the HANDBOOK) to work with others (e.g., the WORKBOOK and the FINAL EXERCISE volume), subjects in the tryout were to some extent initially confused about the correct sequence of exercise events. With experience the confusion disappeared. Nevertheless, changes were made in the User's Manual, the ORIENTATION

volume, and in the WORKBOOK itself to make instructions about sequence clearer. Changes were made in the format with which the schedule was presented. The changes served more clearly to identify which volume was to be referred to, which pages were to be read or worked on, and what activity was to follow next.

2. Revisions in organization of materials used in FINAL EXERCISES

FINAL EXERCISES present subjects with pre-prepared materials and with materials the subjects have to prepare. The preparation of the latter materials depends on a review of the pre-prepared materials (representing completion of tasks which occur earlier in the development sequence). Subjects experienced some confusion about which materials were to be reviewed and which were to be worked on. The revisions of the FINAL EXERCISE volume was designed to resolve this confusion. Each exercise in the revision, consisted of two clearly identified sub-sections. One was marked, "materials to review" and the other, "your assignment." This distinctive identification was intended to provide better initial guidance in the conduct of final exercises.

3. Revisions in how to go through the program

A review of error data and subjects' comments revealed a relatively small number of problems with program content and a moderate level of difficulty in knowing how to take the program. The complete revision of the ORIENTATION volume and the moderately detailed revision of the User's Manual (already cited) were made to deal with this problem. (Evidence - comments - from the tryout with Group III, which used the new ORIENTATION volume, indicates that some of the difficulties experienced by earlier groups were diminished. This is also attributed to the reading of HANDBOOK sub-volume "A" before actually starting the program.)

SUMMARY

A considerable number of changes were made in the program. The changes were made in response to the types of difficulty which were observed (based on performance data and subject comments).

The major changes were in instructions and techniques designed to make it easier for subjects to know what to do in going through the program. Considerably fewer changes were made in materials designed to teach program content. This emphasis in revision reflects the priorities identified in tryout observations.

5. CONCLUSIONS

Potential users of an instructional program, when faced with a decision about the appropriateness of a particular program for their special purposes, have broad information needs. Relevant to their decisions is information about the validity of content, the conditions under which the program was tried out, the results obtained, and, not least, the construction the developer himself puts on all this information. The next several sections attempt to provide this range of information about 'a technology for developing instructional materials,' the title of the program which has undergone a developmental tryout which in turn is the subject of this report.

Content Validity

The potential user of a program on instructional design has every right to ask the question "why this design model rather than another?". For a performance so complex and large in scope as instructional design, the comparative, empirical study of alternative models becomes prohibitive. It would take a considerable amount of time and the cost would be prohibitive. In the absence of data on which to make a judgment about comparative merits of design models, rational considerations provide a serviceable substitute.

The present model is based on a rationally performed, detailed task analysis of the design process (Gropper & Resnick, 1971). The detailed procedures it prescribes, based on research and state-of-the-art considerations, is unusually comprehensive. Tryout subjects who have studied other design models have judged this model to be considerably more structured, detailed, and comprehensive than the others. Based on the available tryout data, it is also possible to conclude that the model can be learned and performed with adequate proficiency.

Does the model offer prescriptions which lead to effective instruction? The question is applicable to any design model and can be answered only by long term, programmatic research. As noted in the original, final report

(Gropper, 1971), it is not an easily researched question. The design process is unusually long and complex. Student achievement is the end product of a long series of interrelated activities. It is difficult to assess the contribution to effective instruction of any particular design activity. The one exception concerns the contribution that can be made by the tryout and revision of instructional materials. Any model which incorporates such a feature can expect, with varying number of tryout cycles, to bring about a desired proficiency level. Any model can be assessed for and differing models can, therefore, be compared for the levels of proficiency they bring about *prior to* revision and for the number of revision cycles they require. However, even such comparisons still leave open the question of how much the algorithms for each major task contribute to the overall effectiveness of a model.

The data collected in the evaluation of the 'instructional technology' program, concerns only the adequacy of the program to teach the use of the model. They provide no evidence to evaluate the adequacy of the model. As of this date, there is only the rational analysis of the model to support a recommendation that it be used. The future, of course, requires empirical data to complement the rational evaluation.

Adequacy of the Training Vehicle

It is not particularly meaningful to attempt to attribute an overall quantitative grade to the program. There is no point in reporting the percentage of people attaining a particular level of proficiency. The performance is too long and too complex for that kind of quantitative reporting. It is more meaningful, it is suggested, to look at parts of the program, to see what works and what doesn't, and to report on these differences.

All told most of the program content worked well with relatively low error rates. This seems to be all the more remarkable in view of the typically large operant spans involved. Participants often read anywhere from five to thirty five or so handbook pages before turning to workbook exercises. Yet error rates on those exercises were acceptably low. For those portions of the program where error rates in excess of

twenty percent were made (very few such portions were found), necessary changes were made. Thus, the developmental or formative data obtained were used to assess the adequacy and to diagnose the nature of inadequacies of individual sections of the program. That relatively few *content* changes were made (relative to the size of the program) suggests the adequacy of the program.

The major changes that were made were largely administrative in nature. Because of the size of the program, the number of program components, the relatively complex sequence of events involved in switching from component to component, novel formats, all contributed to student difficulties in working with the program. While these difficulties diminished as students progressed beyond initial assignments, major changes were still introduced to provide students with a better orientation to the use of the program. Students in Group III had available a few of these changes (thus representing a partial cycle of tryouts). Lessened student difficulty was already noticed just on the basis of just a few of the revisions which were made (e.g., the new ORIENTATION volume and the scheduling of the reading the "A" Volume of the HANDBOOK before the first actual practice assignments).

However, since only one formative tryout was conducted, the complete *revised* program has not been evaluated. There is no expectation that error rates on program content should be any worse. There is every expectation that it will be better. Based on partial results indicating somewhat better administrative instructions, there is also every expectation that *use* of the revised program will proceed more effectively and efficiently.

Generalizability of the Findings

Dependable statements about how this program is to be used and by whom must reflect the characteristics of the tryout sample and the conditions under which the program was administered. The following descriptive statements should be considered in deriving conclusions about the generalizability of the findings.

1. re: The sample

   -- participants were college students involved in some form of advanced training

   -- two of the three groups elected to take the program (as opposed to another option) when they elected to take a course that was being offered by the principal investigator, i.e. they were motivated to take the program;

   -- the program was being taken as part of a course for which a grade was to be assigned (i.e. a motivational factor);

   -- participants had varying backgrounds, particularly varying degrees of experience in instructional technology; but, none had any experience with the design model involved in the current program; and

   -- three separate groups took the program, with all three producing roughly comparable results.

2. re: The conditions of administration

   -- tryout participants worked at their own self-adopted pace; however, self-pacing occured within some time constraints; participants were required to complete weekly assignments and it was within the week-long period that they could adopt their own pace.

   -- A group discussion led by the principal investigator followed each week-long work period. Participants received feedback and corrections.

   -- Group III took a partially revised program, including a revised sequence of activities.

It appears reasonable to conclude that a college educated population, with or without prior instructional design training or experience can negotiate this program. The availability of a trained instructional design to participate in periodic group discussions is desirable. While the course was intended to be self-instructional, based on the tryout conditions which prevailed and on results (i.e. errors) noted prior to remediation during discussions, the conclusion to be drawn is that, without further tryout in which no instructor is present, the program is not fully self-instructional. Some parts of the program do offer more of such a capability than others.

With an instructor present, with a modified self-pacing capability possible, and with a college trained population this program can provide effective instruction in instructional design.

Recommendations

The program on instructional technology has undergone just one cycle of tryout and revision. The revised version clearly requires its own evaluation and a substantially larger tryout group should participate in it. It should be tried out with other types of students and with other discussion leaders available. Having made these obligatory statements, it is also fair to point out that, however small-scale this tryout of an instructional design program has been, this report on that program represents one of the few that is *data-based*. While their are a number of available programs (and books) on the instructional design process, few have published data to support them.

This report provides data to support the view that this program works moderately well. It is anticipated that the revised versions should do better. As such it is a transportable, self-instructional (requiring some expert to provide periodic feedback) program capable of teaching a highly detailed set of instructional design competencies.

6. REFERENCES

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3. Handbook (eleven sub-volumes)
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7. APPENDICES

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A. Workbook Error Rates A.1

B. Results of Final Exercises.....B.1

C. Tryout Subjects' Comments:
Overall Evaluation C.1

D. Tryout Subjects' Comments:
A Comparison with Other Models:.....D.1

E. Tryout Subjects' Comments:
On Handbook Sub-Volumes.....E.1

F. Tryout Subjects' Comments:
on Diagramming.....F.1

APPENDIX A

WORKBOOK ERROR RATES:

Breakdown by Tasks
and by Subsections with Tasks

TASK	J

SECTION #	Error Rate	GROUPS I	II	III
1 — 45 items	>20%	18%	18%	13%
	<20%	36%	09%	
	0%	46%	73%	87%
		n=8	n=6	n=3
2 — 25 items	>20%	36%	12%	36%
	<20%	24%	44%	
	0%	40%	44%	64%
		n=8	n=6	n=3
3 — 23 items	>20%	43%	31%	57%
	<20%	09%	26%	
	0%	48%	43%	43%
		n=8	n=6	n=3
4 — 19 items	>20%	21%		
	<20%	16%	10%	
	0%	63%	90%	100%
		n=8	n=6	n=3

TASK	J

SECTION #	Error Rate	GROUPS I	II	III
☐ ____ items	>20%			
	<20%			
	0%			
		n=	n=	n=
GRAND TOTAL "J"				
1-4 112 items	>20%	28%	13%	25%
	<20%	24%	24%	
	0%	48%	63%	75%
		n=8	n=6	n=3
☐ ____ items	>20%			
	<20%			
	0%			
		n=	n=	n=
☐ ____ items	>20%			
	<20%			
	0%			
		n=	n=	n=

TASK	I

SECTION #	Error Rate	GROUPS I	II	III
1 — 28 items	>20%	11%	07%	14%
	<20%	07%		
	0%	82%	93%	86%
		n=8	n=6	n=3
2 — 9 items	>20%		11%	55%
	<20%		22%	
	0%	100%	67%	45%
		n=8	n=6	n=3
3 — 1 items	>20%			
	<20%			
	0%	100%	100%	100%
		n=8	n=6	n=3
4 — 25 items	>20%	04%	12%	16%
	<20%	28%	04%	
	0%	68%	84%	84%
		n=8	n=6	n=3

TASK	T

SECTION #	Error Rate	GROUPS I	II	III
5 — 15 items	>20%	07%		07%
	<20%	33%	13%	
	0%	60%	87%	93%
		n=8	n=6	n=3
____ items	>20%			
	<20%			
	0%			
GRAND TOTAL "I"		n=	n=	n=
1-5 — 78 items	>20%	08%	08%	17%
	<20%	19%	07%	
	0%	73%	85%	83%
		n=8	n=6	n=3
____ items	>20%			
	<20%			
	0%			
		n=	n=	n=

TASK	G

SECTION #	Error Rate	GROUPS I	II	III
1 — 10 items	>20%			100%
	<20%	50%	30%	
	0%	50%	70%	0%
		n=8	n=6	n=3
2 — 1 items	>20%	100%	100%	
	<20%			
	0%			100%
		n=8	n=6	n=3
3 — 3 items	>20%		100%	67%
	<20%	33%		
	0%	67%		33%
		n=8	n=6	n=3
4 — 1 items	>20%			100%
	<20%			
	0%	100%	100%	0%
		n=8	n=6	n=3

TASK	G

SECTION #	Error Rate	GROUPS I	II	III
5 — 64 items	>20%	25%	11%	25%
	<20%	30%	34%	
	0%	45%	55%	75%
		n=8	n=6	n=3
6 — 7 items	>20%			28%
	<20%	14%		
	0%	86%	100%	72%
		n=8	n=6	n=3
7 — 20 items	>20%	30%	20%	15%
	<20%	25%	05%	
	0%	45%	75%	85%
		n=8	n=6	n=3
8 — 20 items	>20%	20%	05%	15%
	<20%	50%	35%	
	0%	30%	60%	85%
		n=8	n=6	n=3

TASK	G

SECTION #	Error Rate	GROUPS I	II	III
9	>20%	16%	04%	20%
25 items	<20%	28%	28%	
	0%	56%	68%	80%
		n=8	n=6	n=3
____ items	>20%			
	<20%			
	0%			
GRAND TOTAL "G"		n=	n=	n=
1-9	>20%	20%	12%	27%
151 items	<20%	32%	26%	
	0%	48%	62%	73%
		n=8	n=6	n=3
____ items	>20%			
	<20%			
	0%			
		n=	n=	n=

TASK	F

SECTION #	Error Rate	GROUPS I	II	III
1 — 10 items	>20%	60%	60%	60%
	<20%	40%	40%	
	0%			40%
		n=8	n=6	n=3
2 — 5 items	>20%	40%	60%	
	<20%	20%	40%	
	0%	40%		100%
		n=8	n=6	n=3
3 — 27 items	>20%	19%	03%	11%
	<20%	17%	19%	
	0%	67%	78%	89%
		n=7	n=6	n=3
4 — 10 items	>20%		10%	20%
	<20%	30%	40%	
	0%	70%	50%	80%
		n=7	n=6	n=3

TASK F

SECTION #	Error Rate	GROUPS I	II	III
5 — 1 items	>20%			
	<20%			
	0%	100%	100%	100%
		n=7	n=6	n=3
6 — 1 items	>20%			
	<20%			
	0%	100%	100%	100%
		n=7	n=6	n=3
____ items	>20%			
	<20%			
	0%			
		n=	n=	n=
GRAND TOTAL "F"				
1-6 — 54 items	>20%	24%	22%	25%
	<20%	22%	26%	
	0%	54%	52%	78%
		n=7	n=6	n=3

TASK	E

SECTION #	Error Rate	GROUPS I	II	III
1 25 items	>20%		72%	80%
	<20%		24%	
	0%		04%	20%
		n=	n=6	n=3
2 1 items	>20%			100%
	<20%			
	0%		100%	
		n=	n=6	n=3
3 11 items	>20%		09%	50%
	<20%		36%	
	0%		55%	50%
		n=	n=6	n=3
4 11 items	>20%			09%
	<20%		64%	
	0%		36%	50%
		n=	n=6	n=3

TASK	E

SECTION #	Error Rate	GROUPS I	II	III
5 10 items	>20%		10%	
	<20%		30%	
	0%		60%	100%
		n=	n=6	n=3
____ items	>20%			
	<20%			
	0%			
GRAND TOTAL "E"		n=	n=	n=
1-5 58 items	>20%		34%	46%
	<20%		34%	
	0%		32%	54%
		n=	n=6	n=3
____ items	>20%			
	<20%			
	0%			
		n=	n=	n=

TASK	D

SECTION #	Error Rate	GROUPS I	II	III
1 — 8 items	>20%			
	<20%	25%	12%	
	0%	75%	88%	100%
		n=5	n=6	n=3
2 — 10 items	>20%		10%	
	<20%	10%	40%	
	0%	90%	50%	100%
		n=5	n=6	n=3
3 — 10 items	>20%		10%	10%
	<20%	10%	10%	
	0%	90%	80%	90%
		n=5	n=6	n=3
4 — 10 items	>20%		20%	10%
	<20%	30%	40%	
	0%	70%	40%	90%
		n=5	n=6	n=3

TASK	D

SECTION #	Error Rate	GROUPS I	II	III
5 — 4 items	>20%			
	<20%			
	0%	100%	100%	100%
		n=5	n=6	n=3
6 — 1 items	>20%			
	<20%			
	0%	100%	100%	100%
		n=5	n=6	n=3
7 — 1 items	>20%			
	<20%			
	0%	100%	100%	100%
		n=5	n=6	n=3

GRAND TOTAL "D"

1-7 — 44 items	>20%		09%	05%
	<20%	16%	23%	
	0%	84%	68%	95%
		n=5	n=6	n=3

TASK	C

SECTION #	Error Rate	GROUPS I	II	III
1 — 1 items	>20%			
	<20%		100%	
	0%	100%		100%
		n=5	n=6	n=3
2 — 14 items	>20%		07%	43%
	<20%	07%	36%	
	0%	93%	57%	57%
		n=5	n=6	n=3
___ items	>20%			
	<20%			
	0%			
GRAND TOTAL "C"		n=	n=	n=
1-2 — 15 items	>20%		07%	40%
	<20%	07%	40%	
	0%	93%	53%	60%
		n=5	n=6	n=3

TASK B

SECTION #	Error Rate	GROUPS I	II	III
1 — 7 items	>20%		14%	
	<20%		43%	
	0%	100%	43%	100%
		n=5	n=6	n=
2 — 10 items	>20%			10%
	<20%	10%	40%	
	0%	90%	60%	90%
		n=5	n=6	n=3
3 — 10 items	>20%		20%	30%
	<20%		10%	
	0%	100%	70%	70%
		n=5	n=6	n=3
4 — 2 items	>20%			
	<20%			
	0%	100%	100%	100%
		n=5	n=6	n=3

TASK	B

SECTION #	Error Rate	GROUPS I	II	III
5 — 13 items	>20%			23%
	<20%	15%	23%	
	0%	85%	77%	77%
		n=5	n=6	n=3
6 — 3 items	>20%			
	<20%	33%		
	0%	67%	100%	100%
		n=5	n=6	n=
7 — 1 items	>20%			
	<20%			
	0%	100%	100%	100%
		n=5	n=6	n=3
8 — 13 items	>20%			15%
	<20%		38%	
	0%	100%	62%	85%
		n=5	n=6	n=3

TASK	B

SECTION #	Error Rate	GROUPS I	II	III
9 — 1 items	>20%			100%
	<20%			
	0%	100%	100%	
		n=5	n=6	n=3
10 — 17 items	>20%		06%	18%
	<20%		70%	
	0%	100%	24%	82%
		n=5	n=6	n=3
____ items	>20%			
	<20%			
	0%			
GRAND TOTAL "B"		n=	n=	n=
1-10 — 77 items	>20%		06%	19%
	<20%	06%	36%	
	0%	94%	58%	81%
		n=5	n=6	n=3

APPENDIX B

Results of Final Exercises
Groups II and III

Results for Group II

FINAL EXERCISE #1: TASK J

CRITERIA	SUBJECTS					
	#1	#2	#3	#4	#5	#6
ANALYSIS OF PROGRAM RESULTS						
Forms are Correctly Used	Yes	Yes	Yes	---	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes	---	Yes	Yes
PROGRAM REVISIONS						
Content Entries are Valid	Yes	Yes	Yes	---	Yes	Yes

FINAL EXERCISE #2: TASK I

CRITERIA	SUBJECTS					
	#1	#2	#3	#4	#5	#6
DEVELOPMENT OF PROGRAM						
Forms are Correctly Used	Yes	Yes	Yes	No	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes	Yes	No	Yes

FINAL EXERCISE #3: TASK G

CRITERIA	SUBJECTS					
	#1	#2	#3	#4	#5	#6
FORMULATING STRATEGIES						
Forms are Correctly Used	Yes	Yes	Yes	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes	Yes	Yes	Yes
DEVELOPING A PROGRAM						
Forms are Correctly Used	Yes	Yes	Yes	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes	Yes	Yes	Yes

FINAL EXERCISE #4: TASK F

CRITERIA	SUBJECTS					
	#1	#2	#3	#4	#5	#6
CONSTRUCTING A TEST						
Forms are Correctly Used	Yes	Yes	Yes	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes	Yes	Yes	Yes
FORMULATING A STRATEGY						
Forms are Correctly Used	Yes	Yes	Yes	---	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes	---	Yes	Yes

FINAL EXERCISE #5: TASK E

CRITERIA	SUBJECTS					
	#1	#2	#3	#4	#5	#6
SIMULATION						
Forms are Correctly Used	Yes	Yes	Yes	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes	Yes	Yes	Yes
CONSTRUCTING A TEST						
Forms are Correctly Used	Yes	Yes	Yes	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes	Yes	Yes	Yes

FINAL EXERCISE #6: TASK D

CRITERIA	SUBJECTS					
	#1	#2	#3	#4	#5	#6
STATING OBJECTIVES						
Forms are Correctly Used	Yes	Yes	Yes	Yes	Yes	Yes
Content Entries are Valid	Yes	No	Yes	Yes	Yes	Yes
SIMULATION						
Forms are Correctly Used	---	---	Yes	Yes	Yes	---
Content Entries are Valid	---	---	Yes	Yes	Yes	---

FINAL EXERCISE #7: TASK B

CRITERIA	SUBJECTS					
	#1	#2	#3	#4	#5	#6
ANALYSIS OF BEHAVIOR						
Forms are used Properly	Yes	Yes	Yes	Yes	Yes	Yes
Content Entries are Valid	No	Yes	No	Yes	No	Yes
STATEMENT OF OBJECTIVES						
Forms are used Properly	Yes	Yes	Yes	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	No	No	Yes	Yes

FINAL EXERCISE #8: TASK B

CRITERIA	SUBJECTS					
	#1	#2	#3	#4	#5	#6
ANALYSIS OF BEHAVIOR						
Forms are used Properly	Yes	Yes	Yes	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes	Yes	Yes	Yes
STATEMEMT OF OBJECTIVES						
Forms are used Properly	Yes	Yes	Yes	Yes	Yes	---
Content Entries are Valid	Yes	Yes	Yes	Yes	Yes	---

Results for Group III

FINAL EXERCISE #1: TASK J

CRITERIA SUBJECTS

	#1	#2	#3
ANALYSIS OF PROGRAM RESULTS			
Forms are Correctly Used	Yes	Yes	Yes
Content Entries are Valid			
PROGRAM REVISIONS	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes

FINAL EXERCISE #2: TASK I

CRITERIA **SUBJECTS**

	#1	#2	#3
DEVELOPMENT OF PROGRAM			
Forms are Correctly Used	---	Yes	Yes
Content Entries are Valid	---	Yes	No

FINAL EXERCISE #3: TASK G

CRITERIA	SUBJECTS		
	#1	#2	#3
FORMULATING STRATEGIES			
Forms are Correctly Used	---	Yes	Yes
Content Entries are Valid	---	Yes	Yes
DEVELOPING A PROGRAM			
Forms are Correctly Used	N.A.	N.A.	N.A.
Content Entries are Valid	---	---	Yes

FINAL EXERCISE #4: TASK F

CRITERIA	SUBJECTS		
	#1	#2	#3
CONSTRUCTING A TEST			
Forms are Correctly Used	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes
FORMULATING A STRATEGY			
Forms are Correctly Used	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes

FINAL EXERCISE #5: TASK E

CRITERIA	SUBJECTS		
	#1	#2	#3
SIMULATION			
Forms are Correctly Used	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes
CONSTRUCTING A TEST			
Forms are Correctly Used	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes

FINAL EXERCISE #6: TASK D

CRITERIA	SUBJECTS		
	#1	#2	#3
STATING OBJECTIVES			
Forms are Correctly Used	Yes	Yes	Yes
Content Entries are Valid	No	Yes	Yes
SIMULATION			
Forms are Correctly Used	---	---	Yes
Content Entries are Valid	---	---	Yes

FINAL EXERCISE #7: TASK B

CRITERIA	SUBJECTS		
	#1	#2	#3
ANALYSIS OF BEHAVIOR			
Forms are used Properly	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	Yes
STATEMENT OF OBJECTIVES			
Forms are used Properly	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	No

FINAL EXERCISE #8: TASK B

CRITERIA	SUBJECTS		
	#1	#2	#3
ANALYSIS OF BEHAVIOR			
Forms are used Properly	Yes	Yes	Yes
Content Entries are Valid	Yes	Yes	No
STATEMENT OF OBJECTIVES			
Forms are used Properly	Yes	Yes	Yes
Content Entries are Valid	Yes	No	Yes

APPENDIX C

Tryout Subjects' Comments:

OVERALL EVALUATION OF:

(1) MODEL
(2) VEHICLE DESIGNED TO TRAIN OTHERS TO IMPLEMENT IT

Subject #1

The program for developing instructional materials presented in this course could be very useful. I am not convinced that the backward chaining approach is the best way to present the material. The backward chaining in the first three or four handbooks was confusing in refering to concepts and forms not yet encountered. The instructions in these handbooks to read long sections of other handbooks was also awkward. It was only after Handbook F that I was aware of any benefits of backward chaining. I understand that this may be due to familiarity with the entire program format (diagramming) and not just backward chaining.

The use of diagrams may be more useful with some students than others. I had a tendency to read the diagram and then try to put it into prose. I do believe it should be emphasized that students do not have to learn everything in a diagram before moving to the next.

It was not clear how much of the information presented in the program was based on empirical research and how much represented hunches of the author. Perhaps a handbook of references could be provided.

The examples were generally good. They were varied and for the most part clear. The few exceptions were some of the early examples on economic policy

The final Exercises were helpful in understanding the application of the material presented in the handbooks. I feel I would have benefited by some kind of exercises after the last final exercise which carried one problem through all the steps.

I would use the program as a job aid, especially Handbooks G, B, and C. I was disappointed in Handbook H. Does the author feel that individual differences are just not that important or that there is not enough known to say anything? What about treatment-interaction considerations?

I doubt just anyone could pick up the program and use it. The terminology is for persons in areas other than social sciences would be difficult.

Overall I found the program useful and of potential value as a job aid.

Subject #2

General Evaluation of Program

In evaluating the program, the major criteria used was the relationship between the planning stages and the development stages. That is, are the different types of analyses - task, learning, mode, and different classes of tasks, learning, modes, used and dealt with differently in the design and development stages. It appears that in relation to this criteria the program is very good. All analysis (task, learning, modes) and classifications of types of tasks, etc., are consistently used throughout the program in designing and development of instructional program. (handbooks B and G).

If at some future time, I am employed to design and develop an instructional program, I would probably use Handbooks A, B, C, to begin with and then use some of the main concepts presented in Handbooks G and I. I especially like the ideas presented concerning the sequencing of tasks and many of the instructional strategies.

Subject #3

Over-all Evaluation

The program is very comprehensive leaving few stones unturned.

As mentioned in the "Orientation" the optimum learning situation for the program is weekly meetings for critique and discussion. As a matter of fact, I suspect that if one was to attempt the program individually without the group interaction and counseling, he would give up before Handbook G. At that point, insufficient familiarity has been gained to over-ride roughly 10 inches of material left to go. The outlook at that point is very demoralizing. It should be added quickly that in retrospect it is not nearly that bad. For all the length of the program, I don't believe it can be reduced significantly.

If the program is to be implemented in in-service education for teachers, it should be broken into some smaller pieces or spread over a

Subject #3 (continued)

longer time span (a minimum of 2 quarters and maybe 3) to allow the full-time teacher to go through the program.

The knowledge of the technology is much more important for the public school teacher than the competency. I seriously doubt that the tendency could be implemented more than piece-meal in the public school. This situation is probably reversed in an industrial or military training situation where the teacher is more atuned to the competency he is teaching than the competency of teaching.

For me, the program has more value since I intend to return to the military as an instructional technologist. However, should I return to the public schools, its value will decrease.

Part(s) I would use:

J. Evaluate Instructional Materials
G. Formulate Instructional Strategies

Subject #4

No Return

Subject #5

A Discussion of the Gropper Model

The model is somewhat voluminous in the amount of material presented and thus it would possibly take several learning situations (where the model is completely followed through) before one could become comfortable with it in totality.

Although the Index Volume is a repeat of the handbook's contents I still feel that some overall flow diagram or flow chart(s) should be available to the user to enable him to look at the overall picture and then focus in on the particular area (handbook) that he or she might feel they wanted to use.

Subject #5 (continued)

At a less global level certainly many of the handbooks are quite well done and quite informative--example B & G but others are somewhat trivial and as has been said in class are so common sensical that they should be eliminated or at least reduced or combined.

Since the orientation manual is being rewritten perhaps this will straighten out the confusing problem in the beginning of the learning situation where we, as students, did not know what we were to accomplish.

Backward Chaining

As I stated in the other paper I wrote on what I would use from the model, I found the use of backward chaining quite useful. It enables the learner (not necessarily the job holder) to see the results of what should be done and thus work in reverse order to put these component parts together. As I suggested in class, if you had a sufficient size of student population, you could empirically test which approach might do the job better--forward or backward chaining.

In conclusion, I certainly hope to use portions of the model in any instructional design I may be involved in. Also thank you for the material as I am more firmly convinced this approach in the class was more valuable than the alternative selection you gave, even though you lost some students because of it.

Subject #6

Some of the more useful content or recommendations included:

1. The program's consistency and repetition of concepts, its organization and its effective presentation. As a result, I have come out of the course with a better:
   a. orientation to the instructional development process
   b. way of classifying educational problems
   c. grasp of the vocabulary and concepts in ed. research
2. The use of diagramming as an effective and efficient device.
3. All of Handbook G. This handbook will always be the most meaningful and helpful section. Probably as complete as I could want for many years.

Subject #6 (continued)

4. Handbook E. A solid, complete look at simulation. Again, will refer to that section whenever any question about simulation arises.
5. The breakdown of learning into the four basic categories. The breakdown was amenable to concept acquisition research, which is a current interest of mine.

In summary, Handbook E & G were the most solid, effective and efficient handbooks.

Handbooks A, B, D, F, I, J made important contributions. However, I believe that A & B should be combined.

Handbooks C & H were least effective. I disagree with the arbitrariness of C (rationales can be arbitrary) and with the inconsistency between H and the model (as implied in the other handbooks).

As to your model, I believe I would use much of your materials if I was teaching an instructional development course. I would throw out A, shorten B, throw out most of C, shorten D, keep E, F, & G as is, disburse H throw out, shorten I & J. I would also include a model description (and present it first), add a section on documentation and possibly, a section on the relationship of research and development (how the two can be integrated and how they usually coexist). I would definitely make it branched, leaving out whole sections for some individuals if students showed competency on some kind of pretest. Herb, Jerry, Pam and I have had courses dealing with objectives--which also included the idea of specifying the type of learning necessary within the objective.

The backward chaining in the model and the diagramming throughout was excellently thought out and carried through. I thought the Final Exercises were challenging and they supplemented and complemented the backward chaining. I learned much from your examples, the thoroughness and the concreteness helped there. Back to backward chaining, I believe the same effect could not have been accomplished if the handbooks were forward chained.

APPENDIX D

Tryout Subjects' Comments:

COMPARISON WITH OTHER MODELS

Subject #5

Model Comparisons

In comparing Dr. Brigg's model with Dr. Gropper's model some of the main differences are as follows:

1. Brigg's model (at least the manner we approached it in class) used feedback only from him analyzing it in great detail. The results are untestable until the end when summative and evaluative testing can be done as in Gropper's model. Gropper's model approach is the backward chain and thus able to get analysis of output quickly plus the class verbalization is good. It would be better if we received written feedback from Gropper on his analysis of our outputs.

2. The forms used in Brigg's model were to minimal.

3. The final example (products) in Brigg's model were very good.

In comparing Dr. Dick's model (used in EDR 537) the approach was very different.

1. Dr. Dick's model used adjunct program instruction (PI) which assigned readings then quizzed you on the information via CAI terminals. At the completion of all materials then one used the information to develop and test a PI in some material of our choosing. The advantage of this approach over Briggs and Gropper was the use of many other individuals thoughts on the area being studied. The disadvantage was that it was far less structured than Briggs and would be considered completely unstructured in comparison to the material of Gropper's model.

What I Would Use in a Design Course

From Dr. Gropper's course I would make use of the forms on task description, specifications of objectives, test development, plan for instructional strategies, developing instructional materials, and summary of program errors. I would also use the backward chain approach as in many cases seeing the total picture first then working on parts of it are more helpful than by starting at lower levels.

Subject #6

Model Comparison

EDR 537: Techniques of Programmed Instruction

The "systems approach" embodied in this course was based on the Dick model (see Fig. 1A). The course was organized into two parts. The first part looked at the component steps in the model in detail. Each step in the model was introduced by a set of readings (Mager, DeCecco, Gagne, Markle, etc.). Thus, the first half of the course was quite theoretic. The second half of the course was devoted to actually developing a PI text. The text was documented (steps and rationale fully described), including a formative and summative evaluation.

EDR 539: Adaptive Instruction Models

The content here was at a more "macro-level." No practical instructional development experience was needed or taught. The goal of this course was to take and develop an "Adaptive Instructional System." The emphasis was on how the objective (goals), the personological characteristics of learners, the instructional packages and the systems needs (time, cost and resource constraints) interacted, i.e., could be handled simultaneously.

What Will Remain

As a preface, let me explain a few matters. First, I am not interested in becoming an instructional developer. However, I will need to evaluate and use instructional developers' output, as I aspire to become a researcher/coordinator in a public school system and/or at the University level. Second, I have a strong bias against the model used in the course (and I guess, that part of a person who advocates such a model) because it does not allow adaption to individual differences...not even in terms of repetition and review. Handbook H is weak, and the ideas there expressed are not followed up in the other handbooks. In fact, the model and the content would be more consistent if Handbook H were deleted.

While many specific recommendations were useful, I will use and remember the Dick model because it is more amenable to my view and goals. I believe that sequence, step size, instructional strategy, and media type can be adapted (varied) to match individual learners so to facilitate their learning. I choose the Dick model because I am most of all a researcher, and see the development of instruction as a step resulting from research. The seemingly arbitrary decisions concerning error rate, step size, media type, amount of practice and review were, for the most part, rejected. There are more research questions, as far as I am concerned.

APPENDIX E

Tryout Subjects' Comments On:

INDIVIDUAL HANDBOOK SUBVOLUMES

COMMENTS ON HANDBOOK SUB-VOLUME "A"

Subject #1

No Return.

Subject #2

Handbook A

I found A to be very thorough. If I was "on the job," i.e., had to design an instructional program, I would turn to this handbook first and probably follow the general steps.

Don't fully understand why you had domains: knowledge, performance, cognitive, personal/social behavior, and then not attack them (pg. 41).

Subject #3

Handbook A

Handy - but should have been noted at each opporet. in earlier volumes (referring to A.5).

Subject #4

Handbook A

New, useful ideas on concepts.

a. criteria for identifying four types of criterion behavior. (pp. 6-7).

b. Labeling systems for cross-referencing purposes (75).

c. The whole step A.5.2(a) and A.5.2(b).

It would be important to read some sections of A Handbook before starting the other Handbooks, e.g., Step A.5.2 (pp. 77,78,79,81,83,94...).

HANDBOOK A: PLAN STUDY OF CRITERION BEHAVIORS

--Criteria for identifying four types of criterion behavior: knowledge comain, performance, general cognitive skills, personal/social behavior (6-7)

--Determining how to obtain information necessary to describe or generate a model (25)

--Information-gathering techniques likely to be used for different types of criterion behavior (27)

--Selecting sources of information appropriate to types of criterion behavior and types of information-gathering techniques (35)

--Five desiderable properties of information-collection techniques Examples (60)

--Recommended labeling system for cross-referencing purposes (75)

--Sub-Step A.5.2 (a): Selection of forms used in:

a. Task description
b. Steps
c. Sub-steps
d. Task Analysis

Yellow forms included (pp.66-102)

--The whole step A.5 gives a very useful information for information-collecting instruments and procedures (pp. 53-166)

Before reading Handbook B. I would suggest to read Workbook, p. 115, Ex. 2A for a good summary and examples of Discriminations, Generalizations and Associations. (See also pp. 1-16 and 1-17).

Subject #5

A. Plan study of criterion behavior

1. Fairly easy to read
2. The examples of labeling are rather confusing at first glance and perhaps the whole topic of cross-referencing is so basic that people should know outline techniques, without showing it here.

Subject #6

good volume; but valuable to me much more as job aid <u>when</u> job is being actually undertaken

had little patience to stick with the concepts and the verbage.

COMMENTS ON HANDBOOK SUB-VOLUME "B"

Subjects #1 and #2

No Return

Subject #3

This volume was straight-forward. I can't remember anything out of the ordinary. Again, I feel that the back-chaining is having an effect to ease the impact of any new material.

Subject #4

HANDBOOK B: Collect and analyze data about criterion behavior

--Different levels of specificity in describing behavior (28)
Criteria for determining the adequacy of the size of the sample of incidents (30)
--Contingent and non-contingent behaviors (35)
--Criteria for identifying contingent and non-contingent behavior (task, step or sub-step) (p.57)
--See also the whole sub-step B.2.2.:
+ Determining the order of information collection about "performance" that is contingent (illustration) (pp.58-59)
+ Determining the order of information collection about "performance" that is non-contingent (pp.60-61)
+ Determining the order of information collection about "knowledge domains" (pp. 62-63)
--Determining the size of functional units to treat as and label as "TASKS" (79)
--Criteria for identifying functional units at differing levels of generality (84)
--Illustration summarizing how to sub-divide knowledge domains (104)
--Inputs and Actions related to description of terminal behaviors (107)
--Specific inputs vs. input class
Specific actions vs. action class (p.108)

Subject #4 (continued)

--Criteria for identifying when exhibition of terminal behavior after instruction of training requires RECALL vs. TRANSFER (110)

--See the whole sub-step B.4.2.: Identify and diagram discriminations, generalizations and associations. Key point in these materials.

--The whole step B.4.4.: Criteria for identifying difficulty in discriminate, associate, generalize, chaining...(1968-185)

Subject #5

1. Very informative.
2. Fairly easy to read and comprehend
3. The discussion of the flow of information from forms A.5 are very well done.
4. The examples in the 4.2 sections on Task Analysis are quite good.
5. Although I thought I understood B.5 on Mode Analysis, my workbook answers were not usually right and I feel there could be some room for judgment responses in type of mode presented.

Subject #6

1. This volume operationalizes what was A. I believe that Handbook A can be deleted---or altered a bit and used as an introductory, orienting handbook. B is strong enough to stand alone.

2. Well organized volume---it is a bit difficult to evaluate because I had gone through many previous task analyses and it was a bore to get nothing that much different or new--except a numbering-categorizing scheme.

3. The forms are excellent for the task analysis. The forms should be introduced a bit earlier--probably when the types of learning are introduced. They are (the forms) helpful in seeing the "whole."

COMMENTS ON HANDBOOK SUB-VOLUME "C"

Subject #1

No Return

Subject #2

Handbook C

I found "C" to be straight forward and easy to understand. I particularly liked the analysis of the three types of possible relationships among sub-criterion behavior (pp.28) and among criterion behavior (pp. 48), and relationships between 3 types.

Subject #3

Nothing major comes to mind.

Subject #4

New interesting concepts:

a. Vertical and horizontal task analysis (p.20)

b. mentions sub-criterion behaviors can bear to one another (32-33)

I found a contradiction:

p.34, e.g., bottom 2nd column

see also p. 52, #2. 2nd column

Additional Comments: Subject #4

HANDBOOK C: Sequence and Group Criterion Behaviors

--Determining how to make sequencing decisions about vertical and horizontal task analysis results (20)

--Conditions and Examples illustrating three relationships sub-criterion behaviors can bear to one another (prerequisites, providing inputs to one another, sharing common elements) pp. 32-22.
See other examples of this relation (p. 52).
In general, the whole step C.1.2 (pp. 27-40) is very useful.

--Determining how to sequence these different relations (34)

Subject #5

I did these books 2 week ago and thus am trying to recall problems from several weeks ago.

SEQUENCE AND GROUP CRITERION

1. Very verbal and perhaps too much so.

Subject #6

Sequence appears obvious enough a topic (to one who has considered it) to warrant a briefer handbook

More concrete examples would help more than the "ideas" and "General suggestions" put forth

COMMENTS ON HANDBOOK SUB-VOLUME "D"

Subject #1

There were some pages (examples) that were hard to read because of small print - also in workbook. Found confusing terms self-contained and not contained, modified and unmodified preparatory objectives, examples of objectives given - information to be included in objectives good.

Subject #2

Appear to be good analysis for writing objectives. Is consistent with other portions of the program.

Subject #3

I still don't know the difference between "modified" and "intact" preparatory objectives

Didn't find anything on "You Must Learn to Box" on form D.2(2)
Otherwise very straight forward

Subject #4

--pg. 53: Determining how to write objectives. I missed minimum criterion performance here.
--Are there any difference between a) criterion and self-contained? b) preparatory and not self-contained?
--Interesting: concept of forward. reverse and both directions. objectives (p.32)

Additional Comments Subject #4

HANDBOOK D: State Criterion and Preparatory Objectives

--Criteria for identifying Criterion Objectives and Preparatory Objectives (6)
--Examples illustrating situations in which objectives will require forward, reverse or both directions (32)
--Determining whether to plan for (and include in a statement of objectives) two performance directions (33)

Subject #4 (continued)

--Determining how to write objectives (53)

--Criteria for identifying self-contained vs. not self contained preparatory objectives (66)

--Include in objectives (92)

a) Discriminations:

--among inputs
--among outputs

b) Generalizations:

--Across inputs
--Across outputs
--Across actions

c) Associatons/chains:

--between inputs
-- between actions

Subject #5

1. The new term preparatory objective is not a standard term and thus the transfer of prior terminology to this can tend to confuse although not too much.

2. Examples are very good.

3. Part D.2 - Preparation of statement of objectives is very well done.

4. Easily read handbook.

Subject #6

Overall: not as helpful as most handbooks

Except for the "You Must Learn To" in the objectives for students, is common sense for the most part. Having learned objectives last year, I would have rather worked the task analysis first...or both together.

COMMENTS ON HANDBOOK SUB-VOLUME "E"

Subject #1

Didn't find that much info in E or final exercise. What was said needed to be included--beyond that--perhaps this info. could be included as part of another handbook.

Subject #2

I didn't get much of anything out of Handbook E. It seems that most all the information and decisions are obvious.

Subject #3

"E" is thorough and adequate - simulation problems do not arise within the context of "E". They arise from a knowledge of the subject. Therefore requiring the almost constant association with an "expert."

Subject #4

E Volume:

A) the most useful material:

a) summary of procedures on pages 19,34, and 48

b) examples of simulation varying in degrees of logistical burden due either to cost or to the administration considerations (p.57)

c) I think all the volumes read before were much more interesting (G or I for example).

d) I would include this content in Volume F.

Additional Comments Subject #4

HANDBOOK E: Plan Simulation based on instructional and logistical needs.

--Summary of procedures for determining and recording the seriousness of the need to simulate (18)

--Summary of procedures for identifying and recording criterion properties (34)

--Summary of procedures for planning alternative forms of simulation to meet instructional goals (48)

--Examples of simulation varying in degrees of logistical burden due either to cost or to administration considerations (57)

Subject #5

A fairly easy handbook to read. Examples were good. Final Exercise not very challenging.

Subject #6

Good progression; clear; Right length/depth.

--Problem:
When considering logistical and instructional needs, should make a statement that points out that it is important to estimate how much it would cost if a student did not learn.

--Categories are somewhat arbitrary; Sample vs. Standardized difficult to distinguish, at times.
Deciding about manipulation can be the same as deciding about simulation.

--Danger/damage (and other categories)
One must also consider the effect of not learning (on danger, damage, cost).

COMMENTS ON HANDBOOK SUB-VOLUME "F"

Additional Comments Subject #4

HANDBOOK F: Develop Diagnostic and Evaluative Tests

--Product and Process and criteria for identifying three types of outputs (27-28)

--Criteria for identifying how a test item samples criterion behavior (44). See also the whole sub-step F.2.3. (pp. 43-59)

--Illustration of Procedures involved in preparing test items (58)

--Determining how to interpret general errors patterns regarding discriminations, generalizations and associations (84-85)

--Determining the types of probes to use to determine source of errors (108-109)

--Summarizing procedures involved in deciding whether to develop diagnostic probing procedures (116)

--Criteria for identifying what it is you want to find out by using diagnostic test items.

--Determining how to develop recognition test items to diagnose specific types of learning problems (124)

--Summarizing procedures involved in preparing diagnostic test items (128)

COMMENTS ON HANDBOOK SUB-VOLUME "G"

Additional Comments Subject #4

HANDBOOK G: Formulate Instructional Strategies

--Types of predominant learning and performance problems (p.41)

--Examples illustrating this (p.44)

--Criteria for identifying five types of preparatory practice progressions:

+Unit Size
+Mode
+Prompting/fading
+Content
+Frequency variation (pp.74-75: these two pages are the key for understanding the hole sub-step (G.2.1.)

--Determining where to obtain information needed for designing preparatory practice progressions (pp.153 and ff)

--The job of progressions:

+Job Diagram overall view (p.70)
+What is the purpose of progressions (73)
+How to fill the forms (116,119,120)

APPENDIX F

Tryout Subjects' Comments On:

DIAGRAMMING

Subject #1

I find it much easier to use the diagrams now than where I began the materials. There is still the tendency to read the diagrams to "learn" everything there. Find most useful the Job Diagram page in organizing material--Seldom use the diagram on Description of Substep diagram. Forms referred to by a number i.e., "use form A.5 for info. in filling out form" are confusing.

Subject #2

At first I tried to retain too much of the information presented or the sequence of the tasks. Spent tremendous amounts of time. Now I am only revising the steps and putting into my own words what I am supposed to do (Job diagram, etc.). On diagram presenting information about a component (e.g., type of learning or procedure) I am now just skimming over at first and spending more time on them while doing work book exercises and especially on the final exercises. I do not seem to get much information out of diagrams defining or describing something. I find the amount of different kinds of things being covered at one time to be distracting. I seem to miss alot of information. However, when I do the final exercises, I try to follow the step by step procedure presented in the handbook. It is at this time that I seem to learn the most and "fit" things together.

Subject #3

I like this type of presentation of material. I'm not textbook-oriented and therefore appreciate the organization which allows me to delete as I forsee the opportunity. One point - I don't see the need of pps. such as F.26 since they serve mainly for reference purposes and appear in the index volume.

Subject #4

I have found the diagrams useful and instructional in general. Some of them are much more valuable and plenty of material, e.g., Handbook F, pp.84-85; pp. 108-109. The mere fact that the content is presented in a non-traditional way makes the subject more interesting. However, some of the diagrams are trivial and repeat information already given in prior and some individual diagrams. May be this will be useful in the future as a job aid.

Subject #5

1. The Diagrams in general are somewhat complex
2. Initially most diagrams were quite difficult to use
3. Now reading is easier in most cases
4. Content layouts - Good
   Step " - Good
   Page Index - Poor and Confusing
   Substep Layouts - Fair
   Job Diagram - Good
   ID Matrix - Fair
   Decision Matrix - Fair
   Completion Good
   Standards Matrix- Fair
   Examples & Illus. Good

Subject #6

Diagramming:

General: Useful, directs attention, emphasizes the whole and the parts, forces author to be complete, most importantly, puts knowledge into qualitative and for quantitative heirarchies which make diagrams more useful to learners of all levels. That adaptive quality not found in prose (that is why use high-liter). Especially useful for those people who do not think in terms of words, but pictures.

Specific:

Standard Matrix: not as useful as it could be; present earlier and present when presenting forms, especially, useful for concept attainment.